WE CLAIM:

1. A method for identifying a compound that modulates cell cycle arrest, the method comprising the steps of:

(i) contacting a cell comprising a target polypeptide selected from the group consisting of BRCA-1-Associated Protein-1 (BAP-1), Nuclear Protein 95 (NP95), Fanconi anemia group A protein (FANCA), DEAD/H box polypeptide 9 (DDX9), insulin-like growth factor 1 receptor (IGF1R), ubiquitin-conjugating enzyme E2 variant 1 (UBE2V1), aldehyde dehydrogenase, pyruvate kinase, glucose-6-phosphate dehydrogenase, HCDR-3, DEAD/H box polypeptide 21 (DDX21), serine threonine kinase 15 (ARK2), transmembrane 4 superfamily member 1, or ERCC1, or fragment thereof with the compound, the target polypeptide encoded by a nucleic acid that hybridizes under stringent conditions to a nucleic acid encoding a polypeptide having an amino acid sequence a sequence selected from the group consisting of SEQ ID NO:2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, and 28; and

(ii) determining the chemical or phenotypic effect of the compound upon the cell comprising the target polypeptide or fragment thereof, thereby identifying a compound that modulates cell cycle arrest.

2. The method of claim 1, wherein the chemical or phenotypic effect is determined by measuring an activity selected from the group consisting of: helicase activity, receptor tyrosine kinase activity, ubiquitination, ligase, ubiquitin hydrolase activity, ubiquitin ligase activity, receptor binding activity, receptor cross-linking acitivity, protease, and endonuclease.

3. The method of claim1, wherein the chemical or phenotypic effect is determined by measuring cellular proliferation.

4. The method of claim 3, wherein the cell cycle arrest is measured by assaying DNA synthesis or fluorescent marker level.

5. The method of claim 4, wherein DNA synthesis is measured by ^{3}H thymidine incorporation, BrdU incorporation, or Hoescht staining.

6. The method of claim 4, wherein the fluorescent marker is selected from the group consisting of a cell tracker dye or green fluorescent protein.

7. The method of claim 1, wherein modulation is activation of cell cycle arrest.

8. The method of claim 1, wherein modulation is activation of cancer cell cycle arrest.

9. The method of claim 1, wherein the host cell is a cancer cell.

10. The method of claim 9, wherein the cancer cell is a breast, prostate, colon, or lung cancer cell.

11. The method of claim 9, wherein the cancer cell is a transformed cell line.

12. The method of claim 11, wherein the transformed cell line is PC3, H1299, MDA-MB-231, MCF7, A549, or HeLa.

13. The method of claim 9, wherein the cancer cell is p53 null or mutant.

14. The method of claim 9, wherein the cancer cell is p53 wild-type.

15. The method of claim 1, wherein the polypeptide is recombinant.

16. The method of claim 1, wherein the polypeptide is encoded by a nucleic acid comprising a sequence of SEQ ID NO:1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, or 27.

17. The method of claim 1, wherein the compound is an antibody.

18. The method of claim 1, wherein the compound is an antisense molecule.

19. The method of claim 1, wherein the compound is an RNAi molecule.

20. The method of claim 1, wherein the compound is a small organic molecule.

21. The method of claim 1, wherein the compound is a peptide.

22. The method of claim 21, wherein the peptide is circular.

23. A method for identifying a compound that modulates cell cycle arrest, the method comprising the steps of:

(i) contacting the compound with a target polypeptide selected from the group consisting of BRCA-1-Associated Protein-1 (BAP-1), Nuclear Protein 95 (NP95), Fanconi anemia group A protein (FANCA), DEAD/H box polypeptide 9 (DDX9), insulin-like growth factor 1 receptor (IGF1R), ubiquitin-conjugating enzyme E2 variant 1 (UBE2V1), aldehyde dehydrogenase, pyruvate kinase, glucose-6-phosphate dehydrogenase, HCDR-3, DEAD/H box polypeptide 21 (DDX21), serine threonine kinase 15 (ARK2), transmembrane 4 superfamily member 1, or ERCC1, or fragment thereof, the target polypeptide encoded by a nucleic acid that hybridizes under stringent conditions to a nucleic acid encoding a polypeptide having an amino acid sequence a sequence selected from the group consisting of SEQ ID NO:2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, and 28;

(ii) determining the physical effect of the compound upon the target polypeptide; and

(iii) determining the chemical or phenotypic effect of the compound upon a cell comprising the target polypeptide or fragment thereof, thereby identifying a compound that modulates cell cycle arrest.

24. A method of modulating cell cycle arrest in a subject, the method comprising the step of administering to the subject a therapeutically effective amount of a compound identified using the method of claim 1.

25. The method of claim 24, wherein the subject is a human.

26. The method of claim 25, wherein the subject has cancer.

27. The method of claim 24, wherein the compound is an antibody.

28. The method of claim 24, wherein the compound is an antisense molecule.

29. The method of claim 24, wherein the compound is an RNAi molecule.

30. The method of claim 24, wherein the compound is a small organic molecule.

31. The method of claim 24, wherein the compound is a peptide.

32. The method of claim 31, wherein the peptide is circular.

33. The method of claim 24, wherein the compound inhibits cancer cell proliferation.

34. A method of modulating cell cycle arrests in a subject, the method comprising the step of administering to the subject a therapeutically effective amount of a target polypeptide selected from the group consisting of BRCA-1-Associated Protein-1 (BAP-1), Nuclear Protein 95 (NP95), Fanconi anemia group A protein (FANCA), DEAD/H box polypeptide 9 (DDX9), insulin-like growth factor 1 receptor (IGF1R), ubiquitin-conjugating enzyme E2 variant 1 (UBE2V1), aldehyde dehydrogenase, pyruvate kinase, glucose-6-phosphate dehydrogenase, HCDR-3, DEAD/H box polypeptide 21 (DDX21), serine threonine kinase 15 (ARK2), transmembrane 4 superfamily member 1, or ERCC1, or fragment thereof, the target polypeptide encoded by a nucleic acid that hybridizes under stringent conditions to a nucleic acid encoding a polypeptide having an amino acid sequence a sequence selected from the group consisting of SEQ ID NO:2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, and 28.

35. A method of modulating cell cycle arrest in a subject, the method comprising the step of administering to the subject a therapeutically effective amount of a nucleic acid encoding a target polypeptide selected from the group consisting of BRCA-1-Associated Protein-1 (BAP-1), Nuclear Protein 95 (NP95), Fanconi anemia group A protein (FANCA), DEAD/H box polypeptide 9 (DDX9), insulin-like growth factor 1 receptor (IGF1R), ubiquitin-conjugating enzyme E2 variant 1 (UBE2V1), aldehyde dehydrogenase, pyruvate kinase, glucose-6-phosphate dehydrogenase, HCDR-3, DEAD/H box polypeptide 21 (DDX21), serine threonine kinase 15 (ARK2), transmembrane 4 superfamily member 1, or ERCC1, or fragment thereof, the nucleic

acid hybridizing under stringent conditions to a nucleic acid encoding a polypeptide having an amino acid sequence a sequence selected from the group consisting of SEQ ID NO:2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26 and 28.